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EAST INDIA COMPANY AND PLANT CAPITALISM, COMPANY SCIENCE AT THE SAMALCOTTAH "BOTANICAL LABORATORY"

K.V. Ramakrishna Rao
Chennai, kopallerao@yahoo.co.uk

Introduction:

Today, for an Indian, Samalkot (Samarlakota/Samalcottah) of east Godavari district of Andhra Pradesh may not provoke or attract attention, though its name appears in the media during cyclones. However, it had a botanical laboratory where Willaim Roxburgh was working on collecting many Indian botanical samples and observing climatic conditions, which formed part of "Plant capitalism and Company science", as some scholars noted[1]. Such valuable scientific data and information with material evidence were sent to the European Scientists regularly for the furtherance, while the poor Indians were dying in famines, plagues and the exploitation of the British.

Samalcottah Botanical Laborotary:

As has been acknowledged by the East Indian Company scholars, the so-called botanical garden at Samalcottah was in fact, an Indian garden[2], later converted in to a "Mughal garden" to be located there exactly by them. Richard R Grove[3] thus mentions characteristically that William Roxburgh was posted at "Samalcottah in 1798, the ancient location of a Mughal botanical garden". John Francois Royle[4] noted that when Mughals invaded north India, they took over Indian gardens and converted them into "Persian gardens" or also known as "Mughal gardens"! Thus, the understanding of the ESI scholars has been amazing and thus, the modernization and westernization had been so easy.

William Roxburg enjoyed Samulcotah with his family (1781-1793)[5]:

The correspondence of Roxburg gives interesting details as to how he enjoyed life at Samalcotah. According to it, Samulcottah stood on the edge of a hilly region possessing a very interesting flora that Roxburgh explored with great

ardour and it appeared as thourh roxburgh enjoyed his years there. For example, there is a delightful letter from the Rev. John at Tranquebar, where he refers to 'your description of your northern paradise is very tempting.' The letter also has a lightness which is equally appealing, for John Starts the letter 'My Dear Adam' and ends with wishes for 'Eve' as he referred Roxburgh's wife, Mary! Equally, 'The soil of this country is in general fruitful, but better about Corcondah than to the southward, in the vicinity of the Godavery, where it is more sandy. It is, however, by art and industry, brought almost to the state of an earthly paradise." Conversely, shortly after Roxburgh arrived at Calcutta. He was bemoaning the effect of the Bengal climate on his already poor health: "I am now from home on account of a bad state of health which I have been more or less afflicted with ever since I left the Coast but more so for these last two months." He had two wives and his son George was born on 4th April 1789 in Samalcottah and baptized on 1st September 1792 at Samalcottah by Lt. J. Hewenson, Commandant.

Posting of Roxburgh at the Samalcottah Laborotary:

Carl Linnaeus (1735-1778) developed many contacts in Europe, so that they could go to India and collect samples and books required for his research[6]. Particularly Andrew Ross and Johan Gerhad Konig were his students sent to India to collaborate with Roxburg. The plan of work of Roxburgh was recommended by Dr. Patrick Russel[7] from London writing to the Directors of the Company in London and got approved. Thus, Roxburgh was posted at the Samulcottah laboratory in 1781 as Superintendent succeeding Robert Kyd (1746-1793) and he started collecting the samples of plants (Johan Herald to Koenig[8]), seeds, soils (alkalis and chemicals) and Indian books sending them to the European scientists. The first packet of drawings and descriptions sent by him were received in London in 1791 and the last in 1794. The writings of Roxburgh were published under the directions of Sir Joseph Banks in three volumes – first in 1795, second in 1798 and the third in 1819. Roxburgh took much interest in Indian methods of agriculture. Without understanding the method of using natural manure by the Indians, he commented[9], "Western parts of the old world first learned the art of changing their crops" i.e, the Indians knew that method already.

EIC's full support to Roxburgh:

Mr. Ross further writes (13th Aug. 1786), "The most particular orders were given in time to the Chief and Council of Masulipatam, to furnish Dr. Roxburgh with all the necessary disbursements, to enable his to proceed, and to give orders to the Zemindars to assist and encourage the undertaking." The Court of Directors, moreover, in the General letter to Madras, dated 22nd April 1789, expressed their approbation of the undertaking, and ordered that every encouragement and assistance should be afforded to Dr. Roxburgh. It says[10], "in our letter of the 31st July 1787, we approved of the measures you had taken to assist Dr. Roxburgh in the cultivation of Coffee and of the Pepper plant in the Rajahmundry Circar ; but for want of information. Sec, we could not decide how far it was a measure meriting our further encouragement. Haring since received this information, and likewise the moat favorable accounts of the success of the undertakings we now order and direct that you afford Dr. Roxburgh every encouragement and assistance in your power, in the cultivation of such useful articles of our commerce, particularly that of Pepper." The Pepper grown at the hills of Rajahmundry evoked a great interest amon the officers of EIC, as could be noted from adespatch[11] to England, "We informed you that Mr. William Roxburgh had discovered that the pepper was a native of the Hills of Rajahmundry Circar under Masulipatnam, and that we had given direction in consequence to the Chief and Council there to assist him procuring plants and proper ground for the purpose of making his experiments. By the Manship we have pleasure to send for the inspection of your Honours a small quanity of the pepper lately gathered in that District."

Establishment of Plantation, herbarium and laboratory:

J.F. Royle gives the details[12] as to how the plantations were established about six miles inland form Samulcottah, and about eight or ten miles from the nearest point of the ea, where they were sheltered

by innumerable clumps of mange-trees. The idea was to set up pepper plalntation, however, with the laboratory, he wanted to experiment with different plant species. Thus, coffee, Cinnaman nutmeg, Anotto, Guinea grass, bread-fruit and other varieties were introduced in the pepper lantation. Teak was planted at the corners. Herbariums had been famous since the days of the Portuguese[13]. In fact, they were either adoption of the temple gardens or simple take-over, as done by the mohammedans. That a laboratory was there is proven by the evidence of soil testing and analysis done. As Roixburgh[14] notes in the context of cotton, "it succeeds better in the more elevated, dryer, and less fertile soil of Coromandel, than in Bengal, where the plant grows to a great size...." About sugar also, he sent report to London[15]. The usages of thermometers, barometers, rain gauge etc., were described later in the case of meteorological observations and recordings[16]. In fact, on barometer, his paper itself is evidential of interst[17].

The Pepper interest and the Iron working:

The varied of interest of Roxburgh is amazing, intriguing and perplexing, as it appears that he has not left any subject matter in India! The desire of Roxburgh to make his scientific discoveries tend to practical purposes is conspicuous in his endeavors to cultivate Pepper in the Circars, and in the number of useful plants that he introduced into the Company's Pepper plantations established at his recommendation in the neighbourhood of Samulcottah[18]. He writes about[19], "An account of the Hindu method of cultivating the sugar cane, and manufacturing the sugar and jagary in the Rajahmundry district; interspersed with such remarks as tend to point out the great benefit that might be expected from increasing this branch of agriculture, and improving the quality of the sugar; also the process observed by the natives of the Ganjam district". He writes[20] "On the land winds of Coromandel, and their causes" and iron working[21] as "General Foundry Practice, Being a Treatise on General Iron founding, Job Loam Practice, Moulding and Casting of the Finer Metals, etc."! then he works on substitutes viz., cinchona substitute, the Swietenia Febrifuga, discovered by him on the Coromandel coast in the 1790s. Thus, how a botanist had interest form plants to climatic studies to iron working is amazing for India researchers.

Roxburgh's petrological interest:

His experiments with minerals, particularly rocks and soils and the corresponding growth of species in the respective category of soil has been significant. The European interest in India had been multifarious, as they could not cope up with one aspect. The interrivalry among the European colonists was tremendous and their secrecy had been inexplicable. The manufacture of gunpowder by the Dutch and its sudden closure[22] raised many questions. The hidden mineral wealth of India made them vie with each other to capture the lands of India. Really, Roxburgh's petrolgical knowledge had been stupendous. As Royle noted, when large quantities of Potash were imported form America and Russia, and Barilla from Spain and Sicily, Roxburgh proposed to supply the same from India. For he found out that the two species of Salicornia, and one of Salsola were extremely abundant on the Coromandel Coast, could yield barilla sufficient to make sopa and glass for the whole world[23]. Not only that, as labour was cheap and also, the natives would be jobless during drought periods, they could be used to work – such as gathering these plants and burning for the Alkali. Roxburgh, thus suggested[24], "Our extensive, and I may also say impenetrable forests which cover such large tracts of the best lands in India, might by degrees be cleared and turned into Potash, for the same reason, and by the same means". Thus, Roxburg exhibited his capabilities of cost reductiuon of the manufactured goods in India and their sale globally fetching huge profits to the EIC.

Manufacture of flax, cordage ect.:

The cultivation of hemp is related to many usages in India, but dubbing it as narcotics, its manufacture and usage was totally banned. However, in Indian tradition it was used for different useful purposes. Its usage as cordage (twisted high quality ropes used for ship rigging) has a long history, which perhaps, the British wanted to suppress. As Royle[25] noted, "India being an anciently civilized country, and its inhabitants practicing various arts

and manufactures, must necessarily have possessed some plants, of which the fibre could be employed for the purposes of Cordage. This we know is required for many purposes, besides being essential for the rigging of the vessels of their extensive river navigation. In fact, in investigating the subject, we find that the natives of India possess no less than between forty and fifty different plants which yield them materials fit for cordage. The fibres of some of these plants are remarkable for their great strength; those of others more easily cultivated, are deficient either in softness or strength: but as these are produced in the greatest abundance, their characteristics have come to be considered as those of all Indian plants of this nature", which is self-explanatory. Flax was prepared by Dr. Roxburgh in India, and he was of opinion that it could be produced profitably, and in any quantities. Flax plant was grown for its textile fiber and seeds. So he also obtained Hemp, from the true Hemp Plant (Cannabis sativa) both on the Coromandel Coast and in Bengal. Royle found Caoutchou or Indian rubber, long appeared a substance, but we see it every day becoming a more extensive article of commerce. From a source of this substance, discovered in Assam 30 years ago as revealed in his letters written by Royle in 1836. That he has not left the textiles[26] is proven by his 'account of Indian cotton printing'! In other words, the Indians had been using the integrated agricultural method in consonance with nature and society that was incidental and ancillary to the other technologies.

The European observation of climatic changes:

The British / Europeans could observe the climatic changes in Europe and as well as India. In 1709, there was unusually cold winter and famine in Europe and also famine in India, that made them to observe that El Nino[27] ("the Christ Child" in Spanish) events had occurred with less frequency than in the previous 125years. However, El Nino events after 1734 are, for the first time, recorded in rigorous detail by some observers in south India. As it is pointed out the missionaries always acted together, inspite of their European national affiliation. Thus, G.E. Geisler, a German missionary[28], compiled weather diaries (climatic changes of Madras) for the period 1732 and 1737, evidently with observations made at Madras. These diaries provide especially useful information on the mode of onset of the El Nino of 1737, though the long runs of instrumental data for El Nino events for South Asia started coming from 1776 onwards. In 1768-71, the north-eastern India experienced droughts resulting in high mortality, counting up to 10 million persons. There was Partial crop failure in Bengal and Bihar experienced in 1768, while by September 1769 'the fields of rice are become like fields of dried straw'[29]. The district supervisor estimated that the famine of 1770 killed half the population of Purnia district in Bihar.

Many of the surviving peasants migrated to Nepal, where the state was less confiscatory than the East India Company. Hill comments that 'the plight of Purnia was not an isolated one, as more than a third of the entire population of Bengal died between 1769 and 1770, while the loss in cultivation was estimated as closer to one-half'[30] million people in a 130,000 square mile region of the Indo-Gangetic plain and killed up to 10 million of them[31]. It was perhaps, the most serious economic blow to any region of India since the events of 1628-31 in Gujarat-pestilence and famine. As the droughts ended in December of 1770, serious floods took place throughout north-east India. Interestingly, all these studies were made in Madras and Samulcottah as proved by the records of the observatory.

The revenue interpretation of the climatic changes:

The ensuing disease epidemics exacted a high proportion of the total deaths that occurred during the period. Thus, the 1768-70 droughts and famines were a profound blow not only to the system of revenue but to the whole rational of empire. As such they provided the impetus for the evolution of a famine policy. Under the immediate devastating circumstances, Warren Hastings carried out the orders of the Company, 'standing forth as diwan' (Hunter 1897: 392) (Chief state officer) in 1772, ending the dual system and placing responsibility for the security, administration and economy of Bengal squarely on the Company's shoulders.

Hastings' administrative overhaul of Bengal paved the way for the establishment of the British-run, district-level administration which would continue throughout British rule in India. All these developments were triggered by severe El Nino episodes, in which the Roxburg and Company took great interest.

Observations made by Roxburgh:

In peninsular India, every major drought between 1526 and 1900 has been closely associated with the eastern Pacific El Nino[32]. William Roxburgh, an East India Company surgeon, at Samulcottah in the northern Circars of the Madras Presidency (modernday Samalkot) made the earliest indications of the event (later known as El Nino) are contained in the manuscript records of meteorological observations made for the East India Company. He had accumulated a 14 year set of temperature and pressure data[33] from the early 1770s enabling to recognize the exceptional nature of the droughts that began in 1789. These droughts had previously been approached in intensity, he reported to the Company[34], only by those of a century earlier, in 1685-87. These latter years are also now believed to have been characterized by 'very sever' El Nino conditions in the eastern Pacific, though a year later, in 1687-88. Roxburgh's rainfall figures record the consecutive failure of the South Asian monsoon between 1789 and 1792, with the most severe failure being experienced in 1970 (as shown in the Table 1)

Table 1 – Monthly rainfall at Samulcottah, Andhra Pradesh, India May – November 1788-92 (in Inches and Twelfths of an Inch) as Measured by Roxburgh (1793):

Year/ month	1788	1789	1790	1791	1792
May	15.4	1.0	-	4.0	3.6
June	7.20	6.0	1.8	4.1	5.0
July	22.30	6.1	4.9	5.6	604
August	12.2	21.1	3.8	-	1.8
Septem.	8.9	1.4	4.8	3.9	7.5
October	5.9	10.1	1.5	3.3	13.11
Novem.	6	1.3	1.2	6.4	-
Total	77.5	47.7	17.4	26.11	37.10

In the case of the 1789-93 El Nino event (and the 1685-88 El Nino event) a failure of the monsoon in both regions appears to have occurred, whereas, some El Nino events, such as that of 1997, appear to articulate only with a failure of the south-east Asian monsoon rather than with a South Asian failure[35].

The November 1972 over 6000,000 were being attributed directly to the prolonged droughts in the 167 districts of the Northern Circars of the Madras Presidency, and thus half the population there died in 1792 (See Table 2)

Table 2: Deaths from Famine in the Madras Presidency in 1792:

City/Village	No. of death
Muglatore	141,682
Havelly	1,53,956
Havelly	24,874
Peddapore	184,923
Pittapore	82,937
Nandeganah	11,376
Sullapelly	9,018
Poolavam	16,204
Goulatah	12,639
Cotapilly	4,851
Corcoudah	9,035
Ramachandrapuram	7,430
Cottah	7,800
Somapah Villages	2,306
Noozeed	96,210
Char Mahar	16,245

Short periods of intense and highly destructive rainfall were there in between the long drought periods. In one case, in three days at Madras in late October 1791, 25.5 inches of rain fell, 'more than ..... has been known within the memory of man'. The famines of 1788- 94 resulted in very high mortality throughout India and Indians blamed the alien rule, as could be noted in local terminology.

In Bijapur, for example, the year 1791 was known in oral history as 'the Skull Famine' when the ground was covered with the skulls of the unburied dead[36]. The disaster was found in the south with the social disruption caused as since nearly 4 per cent of all villages in the Tanjore district of the Madras Presidency were entirely depopulated in the early 1780s and over 17 per cent in the Sirkali region[37]. The Indian belief had been, whenever aliens intrude, there would be droughts and famines. Whether it is belief or otherwise, a scientific explanation is found now.

Roxburg enjoyed life even during famines at Samalcotah[38]:

One of the comments that Roxburgh made about the famine was to Banks at the end of August 1791: 'The Famine of these provinces begins to rage with double Violence, owing to a failure of our usual rains, a continuance of such distressing misery constantly before my Eyes, is almost the only thing that renders our Residence in these countries during such times distressing. There ought to have fallen about 40 inches from the usual time of commencement of the rains in May or June till the end of August, and there has fallen only 13 ½'. His confirms that these famines could take two years of failed or partially failed rains before becoming really devastating. It also demonstrates how enjoyable Roxburgh felt his time at Samulcottah to have been. Roxburgh used this disaster to some advantage, for he continued, 'these distresses have been a means of bringing to my knowledge many indigenous Vegetables that the poor in great measure live on'.

What happened to the Indian contacts, workers and experts?

When the Europeans could carry out such scientific experiments so easily moving from place to place form Nagore to Samulcottah and thereafter to Calcutta, the Indian participation, association and contribution could not be ignored. When such activities with the infrastructure mentioned had been there, they could not have been established without the Indian help. As in the case of Trignometrical Survey[39], many such field workers, instrument makers[40] and manufactures have been identified[41], here also such suppressed Indian should be brought out to the light. It is a surprise that Roxburgh could not have mentioned the name of any single Indian, when he could mention the Indian names of insects, plants etc., with his varied interest. Therefore, the Indian horticulturalists who worked for and in the botanical gardens, the technical assistants of the laboratories, the experts who helped him to identify, gather, preserve and export to London, the contacts who supplied the books and such other details have to be gathered to find out the reality of the scientific work done at Samulcottah

Multifarious interest of Roxbugh and his hidden agenda:

A study of the works of Roxburgh and others give wealth of information for scientists and historians to work further to dig out more interesting and informative details[42]. Actually, the presence of wood and fibre point to a fact of boat and ship-building during 11th to 18th centuries and its disappearance in Coromandel coast has been a mystery. Few are pointed out here:

1. Plenty of teak on the Coromandel coast:

The teak was also long ago pointed out by Dr. Roxburgh as abounding on the mountainous parts of the Coromandel Coast and on the banks of the Godavery, at the Forests above Rajamundry. It extends also far into Central India, though there it is very dwarfish in size. A very extensive collection of Indian Woods is contained in the Museum of the India House. One of 117 specimens was sent by Dr. Roxburgh.

2. Indian hemp:

Dubbing it as narcotics and its disappearance, in spite of its wide spread usage. It was grown in the Coramandel coast used for the manufacture of cordage, used extensively in the boats and ships.

3. Insects, worms and their dependence on the plants:

His research on different insects, worms (including silk worm), Chemes Lacca[43] etc., have been interesting and intriguing.

The multifarious exploitation of the EIC:

As the EIC has been with many interests, his interests in botany, metallurgy, medicine, at one side and his interaction with the missionaries like William Carey, Rev. John (Tranquebar) and Indologists William Jones, Colebrooke etc., at the other side make researchers wonder about his status. David Arnold notes[44] that, "The early mentioning that Wallich received form Carey and Roxburgh did much to shape the 'improving' agenda and materialistic approach to botany that Wallich subsequently brought to the company's service". Willam Carey and Roxburgh had contacts in carrying out their agenda, as Carey was also considered as, "one of the most extraordinary men who ever came to India both as a missionary .....and a botanist and agriculturalist". Incidentally, this remark[45] was from Nathaniel Willich, another botanist. Roxburgh was at Nagore between 1778 and 1780, where he was serving as a surgeon, but, he became interested in interconnections between drought and famine[46]. Then, only he was shifted to Samalkot in 1781.

How "Green imperialism", "Plant Capitalism", "Company science" exploited India:

The correspondence of Roxburgh has been explicit about the exploitation of the Indian natural resources by all means. Cost reduction, huge profits and scant regard for human values have been the hallmark of such plant capitalism coupled with green imperialism, where blood, flesh and skulls were not cared. The "growing of potentially economically useful crops" as repeatedly mentioned in the documents prove the harassment of cheap labour even at disastrous conditions. Therefore, the background of the Samalkot laboratory reveals the following:

1. Economic exploitation
2. Motivated botanical research
3. Colonial control
4. Military dominance
5. Administrative ruthlessness
6. Imperial arrogance

These are mentioned as "Green imperialism", "Plant Capitalism", "Company science" and so on by the present-day researchers. Perhaps, this has also been one of the factors for the 1857 upraise turning into the War of Independence or Sepoy mutiny or just rebellion! The glorification of the EIC and the British for the contribution of Indians may have to be reassessed in the context of LPG regime that occurred 300 years ago and now also.

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[42] Royel has recorded about Roxburgh, "From the connection of the several cultures with one another, we have been led to trace their history further than is consistent with a due attention to priority of date. But having commenced with stating that Dr. Roxburgh had paid attention to the culture of all the great staple products of India, we have shown that his experiments, whether on Pepper, sugar, Indigo, cotton, Flax, Hemp, or Mulberry, or his observations on the production in India of Potash, Barilla, Caoutchouc, or of Wood Oil, were conducted on the soundest principles, and anticipated much of what has been subsequently done. Dr. Buchanan Dr. Roxburgh, having proceeded to England Meds Dr. for the benefit of his health, died there in the year 1814. He was succeeded in his office of Superintendent of the Botanic Garden at Calcutta by Dr. Francis Buchanan, of the Bengal Medical Establishment, who afterwards assumed the name of Hamilton. He was as distinguished for laborious research as for the variety of his attainments, and the zeal with which he endeavoured to develop the resources of the various parts of India which he visited, as displayed in his Journey to Nepal; his Surveys of Mysore, and of the South-eastern Provinces of the Bengal Presidency, in his account of the Fishers of the Ganges, and in his Commentaries on the Works of Rbeede and of Rumphius." Royle, Opto.cit, pp.173-175.

[43] William Roxburgh, Chermes Lacca, communicated by Patrick Russel, Phil Trans Royal Society, 1791, Vol. 81, pp. 28-235. Can be down loaded form http://royalsocietypublishing.org

[44] David Arnold, Plant Capitalism and Company science: The Indian Career of Nathaniel Wallich in Modern Asian Studies, Cambridge University Press, Vol. 42, No. 5, 2008, p.907.

[45] Nathaniel Willich, A Brief note concerning the Agricultural and Horticultural Society of India, Hooker's Journal of Botany, Vol. 5, 1853, p.137.

[46] Richard R Grove, Green Imperialism : Colonial expansion, tropical island Edens and origins of Environmentalism, 1600-1800, Cambridge University Press, London, UK, 1995, p. 401